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In re Application of

Application Number

09/063924

Filed

April 22, 1998

Paper No. IF/2

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United States Patent Number 6090178, column \_\_\_\_\_, line, \_\_\_\_\_ or

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*Darlene Jones*

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Darlene Jones

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703-418-0330

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JUN 08 2005

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United States Patent [19]  
Benini

US006090178A

[11] Patent Number: 6,090,178  
[45] Date of Patent: Jul. 18, 2000

[54] FRANGIBLE METAL BULLETS,  
AMMUNITION AND METHOD OF MAKING  
SUCH ARTICLES

[75] Inventor: Joseph C. Benini, Kersey, Pa.

[73] Assignee: SinterFire, Inc., Kersey, Pa.

[21] Appl. No.: 09/186,366

[22] Filed: Nov. 5, 1998

Related U.S. Application Data

[62] Division of application No. 09/063,924, Apr. 22, 1998;  
abandoned.

[51] Int. Cl. 7 ..... B22F 3/02

[52] U.S. Cl. ..... 75/245; 75/247; 102/517;  
419/2; 419/44

[58] Field of Search ..... 75/245, 246, 247;  
419/44; 102/517

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2,409,307 10/1946 Patch et al.  
3,123,003 3/1964 Lange, Jr. et al.  
3,216,358 11/1965 Findeisen  
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3,439,619 4/1969 Bock et al.  
3,951,035 4/1976 Dautzenberg et al.  
4,112,846 9/1978 Gilbert et al.  
4,850,378 7/1989 Dinkha et al. ..... 102/501

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[21] SCM Metal Products, Inc. Brochure, "Premixed Bronze  
Powders for P/M Bearings," (1996).

Primary Examiner—Ngocian Mai  
Attorney, Agent, or Firm—Finnegan, Henderson, Farabow,  
Garrett & Dunner, LLP

ABSTRACT

[57] A frangible metal bullet, a method for making it, and  
ammunition made therefrom. The frangible metal bullet is  
formed from a mixture of metal particles and metal or  
metalloid binder forming material which is compacted into  
the desired shape, heated to a temperature above that needed  
to form at least one intermetallic compound but below the  
temperature of joining of the metal particles by sintering and  
below the temperature of formation of substantial amounts  
of a ductile alloy of the metal of the particles and the metal  
or metalloid binder forming material and then cooled. Such  
bullets have sufficient strength to maintain their integrity  
during firing but disintegrate into powder on impact and can  
be formulated to be lead-free.

23 Claims, 1 Drawing Sheet



US006090178A

**United States Patent** [19]  
**Benini**

[11] **Patent Number:** **6,090,178**  
[45] **Date of Patent:** **Jul. 18, 2000**

[54] **FRANGIBLE METAL BULLETS,  
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SUCH ARTICLES**

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[73] Assignee: **SlinterFire, Inc., Kersey, Pa.**

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419/2; 419/44**

[58] **Field of Search** ..... **75/245, 246, 247;  
419/44; 102/517**

[56] **References Cited**

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4,850,378	7/1989	Dinkha et al. .... 102/501

4,958,572	9/1990	Martel .....	102/529
5,078,054	1/1992	Asshok et al. ....	102/517
5,237,930	8/1993	Blanger et al. ....	102/529
5,399,187	3/1995	Mravic et al. ....	75/228
5,616,642	4/1997	West et al. ....	524/439
5,665,808	9/1997	Bilsbury et al. ....	524/439
5,679,920	10/1997	Hallis et al. ....	102/506

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*Primary Examiner*—Ngoclan Mai  
*Attorney, Agent, or Firm*—Finnegan, Henderson, Farabow, Garrett & Dunner, LLP

[57]

**ABSTRACT**

A frangible metal bullet, a method for making it, and ammunition made therefrom. The frangible metal bullet is formed from a mixture of metal particles and metal or metalloid binder forming material which is compacted into the desired shape, heated to a temperature above that needed to form at least one intermetallic compound but below the temperature of joining of the metal particles by sintering and below the temperature of formation of substantial amounts of a ductile alloy of the metal of the particles and the metal or metalloid binder forming material and then cooled. Such bullets have sufficient strength to maintain their integrity during firing but disintegrate into powder on impact and can be formulated to be lead-free.

**23 Claims, 1 Drawing Sheet**



US006 478A

# United States Patent [19]

[19]

Benini

[11] Patent Number: 6,090,178

[45] Date of Patent: Jul. 18, 2000

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SUCH ARTICLES**

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[73] Assignee: SinterFire, Inc., Kutztown, Pa.

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